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November 24, 2004

**PRIVILEGED AND CONFIDENTIAL  
ATTORNEY CLIENT INFORMATION**



Mr. Noboru Otsuka  
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RE: Petition-To-Make-Special Search  
For: **MULTI-SITE REMOTE-COPY SYSTEM**  
Your Ref. No.: 340300944US01  
Our Ref. No.: HIT 1139

Dear Mr. Otsuka:

We have completed the petition-to-make-special search at the U.S. Patent and Trademark Office regarding the above-identified invention. The field of search covered Class 711, subclasses 111 (U.S. & Foreign) and 114 (U.S. & Foreign). Additionally, a computer database search was conducted on the USPTO systems EAST and WEST for U.S. and foreign patents; a keyword search was conducted in Class 707, subclass 204; Class 711, subclasses 112, 113, 162, 165 and 167; and Class 714, subclasses 5, 6 and 7; and a literature search was also conducted on the internet and commercial databases for relevant non-patent documents. Examiner Reginald Bragdon in Class 711 (Art Unit 2188) was consulted in confirming the field of search.

The search was directed towards a multi-site remote-copy system. In particular, the search was directed towards claims 1-16 of U.S. Application Number 10/676121. The claims describe a system comprising a computer; a storage subsystem, wherein the computer duplicates data and writes them into plural storage areas of the storage subsystem, wherein the storage subsystem transfers content of data update into a first storage area among the plural storage areas, in which the data have been duplicated and written, to a second storage subsystem connected to the storage subsystem, wherein the storage subsystem transfers the content of the data update into a second storage area, in which the data have been duplicated and written, to a third storage subsystem connected to the storage subsystem. A method of duplicating data in a system including a first site, a second site and a third site, comprising steps of duplicating data in the first site to store them in a first and a second storage areas; transferring update data of the first storage area to the second site by a synchronous

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remote copy; transferring update data of the second storage area to the third site by an asynchronous remote copy; and writing a log of a database into a first storage area of a storage subsystem of the first site by a computer, and as further claimed in the disclosure.

Please note the enclosed documents listed in numerical order for convenience:

**U.S. Patent Number**

5,555,371  
5,615,329  
5,673,382  
5,870,537  
5,937,414  
6,477,627  
6,587,935  
6,813,683

**Inventor(s)**

Duyanovich et al.  
Kern et al.  
Cannon et al.  
Kern et al.  
Souder et al.  
Ofek  
Ofek  
Tabuchi et al.\*

**Published Patent Application**

2003/0105934  
2003/0145168  
2003/0188233  
2003/0200387  
2004/0024975  
2004/0153719  
2004/0230756  
2004/0230859

**Inventor(s)**

Kimura et al.\*  
LeCrone et al.  
Lubbers et al.  
Urabe et al.\*  
Morishita et al.  
Achiwa et al.\*  
Achiwa et al.\*  
Cochran et al.

**Foreign Patent Number**

EP 1283469

**Inventor(s)**

Nakano et al.\*

\*Patents assigned to Hitachi

**Non-Patent Literature:**

"IBM TotalStorage Enterprise Storage Server Resiliency Family",  
source(s): IBM

"Disaster Recovery Issues and Solutions", source(s): Hitachi

"Data Protection and Disaster Recovery", source(s): SNIA



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**Non-Patent Literature:**

“Disaster Tolerant Unix: Removing the Last Single Point for Failure”,  
source(s): illuminata.com

**Brief Description Of The Documents:**

U.S. Patent Application Number 2004/0024975 (Morishita et al.) shows a remote copy for duplicating data in a storage system at a remote place. The system includes a synchronous remote copy for transferring data to a secondary storage control unit before a termination report of write processing carried out in response to a write request from the host (1), or another storage system (2), and an asynchronous remote copy for transferring data to a secondary storage control unit asynchronously with a write request after a termination report of write processing. See figures and sections [0022]-[0040].

U.S. Patent Application Number 2004/0153719 (Achiwa et al.) shows a information processing system including a first storage apparatus and a first information processing apparatus that accesses the first storage apparatus installed on a first site; a second storage apparatus and a second information processing apparatus that accesses the second storage apparatus installed on a second site; and a third storage apparatus and a third information processing apparatus that accesses the third storage apparatus installed on a third site. A synchronous system or an asynchronous system may be employed depending on differences in the condition in sending a data write completion notice from a storage apparatus set as a replication source to an information processing apparatus when data is written in the storage apparatus set as the replication source. See figures, claims and section [0047]+.

U.S. Patent Number 5,937,414 (Souder, et al.) shows a method and apparatus for replicating data. The method allows changes to the same body of data to be replicated synchronously to some destination sites and asynchronously to other destination sites. Such mixed propagation configurations allow synchronous updating to selected remote copies of replicated data where data integrity is a high priority, and asynchronous propagation to remaining copies of replicated data in order to allow transactions to be committed locally regardless of whether the transaction is committed at a remote copy of the replicated data. See figures and summary.



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U.S. Patent Numbers 5,555,371 (Duyanovich et al.), 5,615,329 (Kern et al.), 5,673,382 (Cannon et al.), 5,870,537 (Kern et al.), 6,477,627 (Ofek), 6,587,935 (Ofek), 6,813,683 (Tabuchi et al.), U.S. Patent Application Numbers 2003/0105934 (Kimura et al.), 2003/0145168 (LeCrone et al.), 2003/0188233 (Lubbers et al.), 2003/0200387 (Urabe et al.), 2004/0230756 (Achiwa et al.), 2004/0230859 (Cochran et al.) and European Patent Number 1283469 (Nakano et al.) show a multi-site synchronous/asynchronous remote copy systems.

While the above-noted Examiner was consulted and confirmed our opinion that the most relevant areas for this invention were reviewed, further searching may uncover additional patents. NOTE: The field of search included the most pertinent areas identified by the Examiner and our office as containing relevant patents.

Enclosed are copies of the cited documents and our invoice for services rendered and disbursements for this matter. NOTE: U.S. Patent Number 6,209,002 and U.S. Patent Application Number 2003/0051111 included in the search request have not been included in this search report.

As always, if you have any questions regarding this search, please do not hesitate to call us at (703) 413-5000.

Very truly yours,



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TWK/RCP/css  
Enclosure

